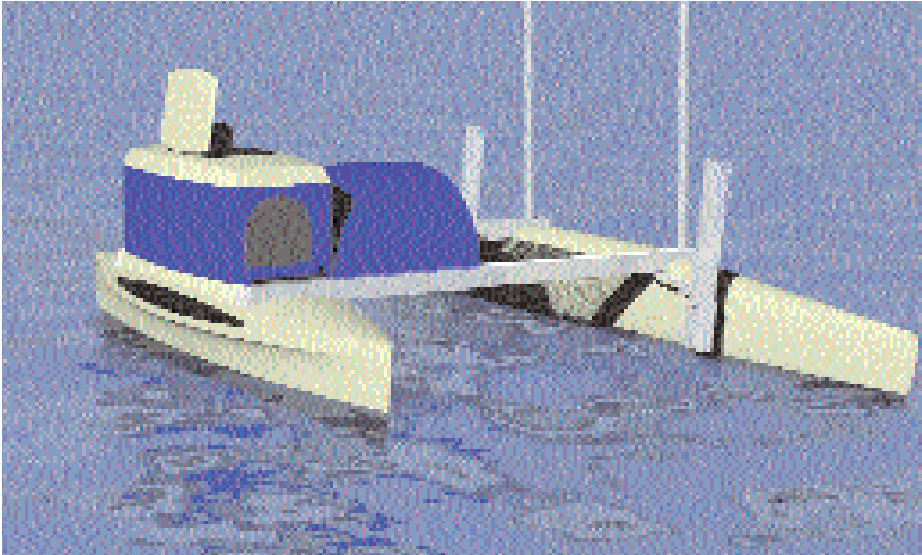


new kid in town



Designing and developing Elementarry, a new type of boat

■ by ROB DENNEY

Following on from our considerable success with the larger harryproas, we have had a lot of requests for smaller proa designs. Mostly, people want one of three things:

1. A really fast boat to beat the local beach cats;
2. A comfortable camper/day sailer;
3. Something people can test the proa concept on before deciding on a larger version;
4. Quick and easy to rig;
5. Low cost.

THE result was Elementarry, a trailerable proa with telescoping beams and the option of an interchangeable windward hull. A versatile boat that can be used for racing, fast day sailing and camping.

A description of the boat and the reasons for the choices it involves, follows ...

Proas always sail on their leeward hulls, so this was optimised for speed. 7.5m long, with fine ends. No rocker as it does not need to tack (see shunting, next page). The hulls are female moulded using vacuum bagged foam and carbon in epoxy resin. This seems extravagant, but the price of carbon in bulk is now quite close to that of fibreglass, yet it is stiffer, lighter and stronger. The hulls are built in two halves. Three bulkheads, mast steps and rudder supports are installed, and

then joined together along the deck and keel. The ends of the hulls are solid foam to act as a cushion in case of impact.

There are two options for the windward hull. The race version has a simple four metre hull, more a training wheel than a hull as it should always be airborne when racing. The camping version has a pop top, a pop side, and half the trampoline is foam cored. At anchor, the top and side pop (see rendering) and there is full headroom and a generous double bunk. While sailing, the hull contains two seats, space for a porta potti and storage for enough gear for a weekend for two. Either of these hulls can be fitted to the leeward hull in a few minutes. The rigs and steering are common to both.

The beams are carbon/foam and telescope from 2.4m to 4m. At 4m it has the same righting moment as a twin

trapeze Tornado, but with the proa crew sitting down. Trapezes are in the 'to be tried' basket. Telescoping is a fairly easy task for two people on the specially adapted trailer. Each beam has a locating pin. The beams are integral with the hulls so there are no fastenings and no potential leaks. The masts are supported by the beams, concentrating the loads and lowering the weight.

The rig size (22sqm) was chosen to match the Tornado, which seemed like a good benchmark, as it is the fastest of the small cats. We chose a schooner rig to get the centre of effort as low as possible and to aid in maneuverability, especially when shunting (see below). Schooner rigs have a lousy, and well earned reputation for upwind sailing. We thought we could overcome this by having very large roach sails, enabling the rig to work more like a sloop than a pair of una rigs. The smaller masts are easier to handle, but weigh and cost a little more than a single mast.

The masts are carbon and unstayed, which reduces the cost significantly (no wires, terminations or fittings on the boat), speeds up rigging (tip the boat on it's side and pop them in the hole) and

reduces air drag, an often overlooked penalty of stays. Because they are unstayed, the tips flex in gusts, providing an automatic depower function, which removes the need for a lot of adjustments to the rig. A luff and leech downhaul and a sheet make the rig extremely simple to operate. The masts weigh 11kgs each and fit inside pocket luffs on the main. The battens fit into camber inducers on the mast, a set up similar to modern windsurfers. The carbon booms are rigidly attached to the masts. The endless sheets are a 2:1 purchase, adequate for the self vanging, 2m long boom.

The rudders are mounted on the inside of the leeward hull, 25% from the ends. They are oversized and also function as centreboards. They are considerably lighter than a standard cat's two rudders/two boards set up, and although there are some losses from surface piercing foils, there are none from daggerboard cases, and no holes in the hulls to leak. All the fittings for the rudders are composite. The rudders can be easily lifted and kick up on impact. Tillers and tiller extensions are carbon.

The weight of the prototype is 130kgs. More than expected, but with a number of things that will be different on future boats. One hundred kgs is our goal, which compares well with 160kgs for Tornados.

At press time, we have built, sailed and raced the racing version. We have licensed it to be built by Wangka Boats in Belgium, who will be building it from nomex and carbon, with masts and sails supplied by us. The first two of these will be campaigned in various European races this northern summer. We have also licensed Multicascos in Brazil to build the camping version in polyester. There have been a few hold ups on this, but the first one is expected in the water this summer. Unfortunately, prices for these boats are not available at present. We are building them in Australia on a one-off basis, which makes them expensive compared to the production boats, cheap compared to a Tornado. The race version is \$25,000, the camper \$30,000. We are also selling plans (\$1000) for amateur builders to build them in foam or strip planked timber, with the option of building everything yourself at a materials cost of \$5,300 plus freight and tax. We can supply any or all of the components if required.

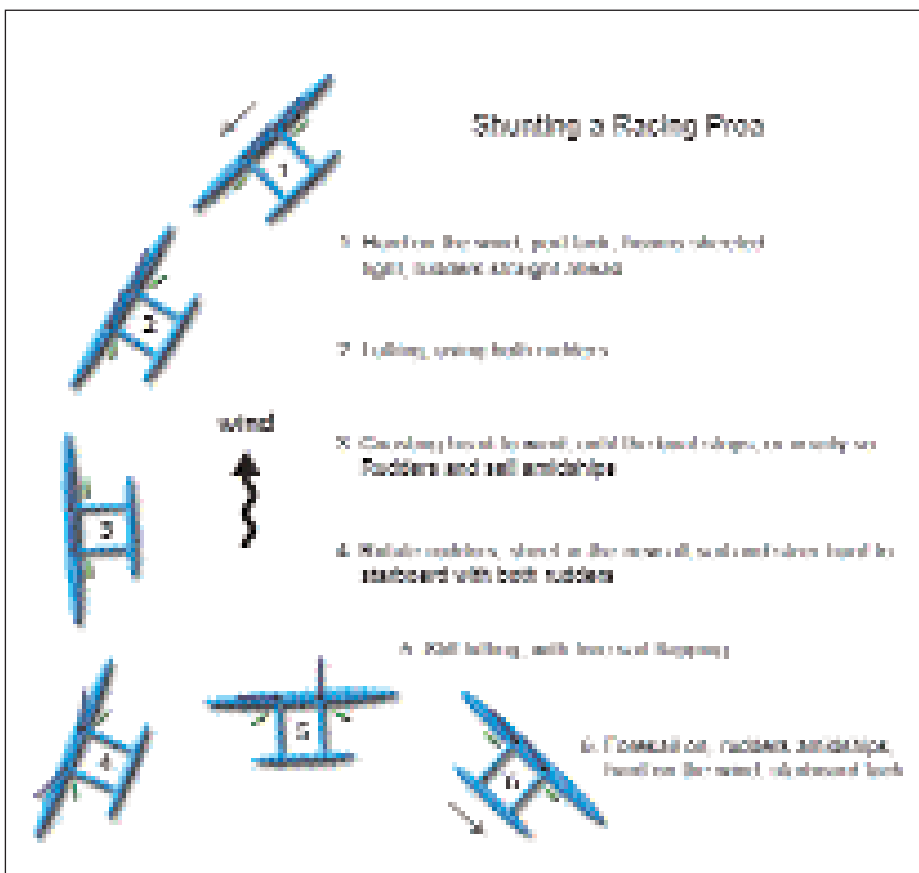
Sailing trials and the first race

The boat was built on a shoe string budget, when time permitted. We also used it as a test bed for various new construction techniques including low cost carbon spars, simple female moulds, composite fittings and novel beam/hull attachments.

The first sail, from my sailing diary:

For all the usual reasons the boat was not quite complete when I arrived from Perth. Didn't stop it looking very quick, and a few pushes with my knee convinced me it was plenty stiff enough. On the down side, we agreed the rudder frames looked marginal, they had only been finished the day before. We spent the day putting on the tramp and fitting the cradles to the trailer. We also had our first look at the sails, and decided either the masts were too stiff or the sails had insufficient luff curve.

Next day, we took it down the beach. Wind 10-15 knots, direction about 45° off directly onshore. Undid the straps on the



ww hull, lifted it up and slid the masts into the lw hull which is in pivoting cradles. Pushed the masts in, and slid the sails over the masts. Took less than five minutes. Putting in the battens, playing with the sail shapes and measuring and buying the running rigging took the next 90! We then flipped it up, and telescoped the hulls. Took another couple of minutes. Because there was a bit of surf running, three of us picked it up and carried it into the water. Getting through the surf was easy enough, I held the front, Mark got the rudders down, we clambered on, sheeted in and off we went.

The trampoline stretched as the knots tightened up, so I was sitting in the water, close to the lw hull, Mark was perched on the windward hull, having his first proa sail. Acceleration was good, the first shunt was after about 100m. Bit of confusion as Mark had both tillers and I pulled in the aft sail first instead of the fore sail. The battens were most reluctant to flop over, but some violent boom pulling did the trick. A deep breath, some instructions and off we went. Next shunt 200m later alongside a rock wall.

Two hundred metres back and an effortless shunt, followed by another. Cleared the end of the jetty, bore away a little, and up came the windward hull. Eased sheet, Mark luffed, down it came. Some ominous cracks from the rudder areas. Sailed across to the other side of the bay, a few more hull flies, and noises, then we noticed the rudder frames coming apart, so decided enough was enough. Sailed ddw back to the shore.

Max speed? gps was in my bag, so no idea. Quick, with potential to be quicker. Tacking angle? No idea, not great, but this was nothing to do with the rig or the boat. Schooner? No idea re performance, but shunting is a dream. Potential? Huge.

We put it on the trailer and were ready to go home in 30 minutes, much of which was spent chatting to incredulous onlookers and tying on gear which will eventually have cradles/boxes to sit in.

Similar conditions for the next sail, with beefed up rudders and recut sails.

I arrived at Coffs Harbour Friday to be met at the airport by Mark, who took me down to the beach where the boat was nearly rigged and ready to go. Such service! Donned the wetsuit and off we



went, through small surf and a near on shore breeze. No problem getting going. I took the sheets, Mark the tillers and shunting was very easy. We played around a bit and practised shunting, then inadvertently capsized.

The boat lay on its side, but was easily righted with help from a passing fisherman. Decided we needed a righting pole. Top gps speed 15.6 knots, wind according to the local yacht club wind gauge, peaked at 15 knots. The sails looked a lot better, but still weren't perfect. The booms bonded to the masts worked well, and the new rudder

bulkheads made the rudders far stiffer and stronger.

Had another sail on Saturday and took family and friends sailing. (see sidebar of a first timers first sail) Mark and I spent half an hour buzzing upwind and down between two buoys a couple of hundred metres apart and managed to convince ourselves we were ready to race. No breakages to fix.

Sunday morning headed for Point Manning for their annual marathon. Thirty four kilometres/18.5 nautical miles of mostly downwind sailing in a narrowish tree lined river. Fifty boats, 12

in our class, two very hot F18 cats with spinnakers and double trapezes, two nice A cats, a couple of Hobie 18s, a Taipan 5.6 and a couple of one offs. Breeze very gusty and changable, max was probably 20 knots in the puffs. We got there an hour before the start, and were ready to go in 40 minutes. Tying in the battens took a large part of this.

We got a mid fleet start and blasted off on a broad reach, at similar speeds to everyone except the F18s, one of which was very quick under spinnaker. The reach became a run, and we ended up on the light air side of the river, sailing very slowly. Shunting to get to the other side was far slower than the others gybing so we lost ground, although picked it back up once we got the breeze. The boat was marginally slower ddw than the H18s and A cats gybing back and forth across the river when we were in the same breeze, much slower when we were on the no wind side. We may have been quicker if we had gone wing and wing. Shunting was totally controlled and safe, at least two of the cats capsized during their gybes.

We had not yet fitted sheet cleats and Mark, (who had never raced a boat before) and I, are really too lazy for this sort of racing so sat side by side half way along the beam, easing the sheets, luffing or bearing away each time we flew a hull, and grinning like lunatics. Fit young fools in an optimised boat would have been moving in and out with cleated sheets and

sailing much, much quicker. They would also have moved aft on the lee hull during the shunts to speed them up and lifted the forward rudder as soon as the breeze was aft of the beam, something we only did occasionally.

The rest of the race was in pretty much the same vein, apart from us going aground to prove the kick up rudders work and a very short stretch hard on the wind when we sailed higher (and much faster) than a hot 14' dinghy which had started an hour before. We also had a very quick broad reach, definitely the fastest the boat had yet gone, but the gps had turned itself off, so no idea how quick.

We finished fifth, may have been third if we hadn't run aground. Elapsed time was 93 minutes, the hot F18 did it in 73, a difference of about 25%. Can we find another 25%? With ease. More active (and able) crew, optimised sails and controls and better tactics will easily supply the deficit.

The boat is a rocket, very easily sailed and controlled and quick to rig/derig. We now need to fine tune the controls, try different widths and options and learn how to sail it fast.

Answers to some of the questions we are asked:

How did the schooner rig work? Extremely well, at this stage of the game. Seems to go upwind well (need some serious windward work to test this) although how much of this is due to the



near rectangularity of the sails, I don't know. Our sails/rigs looked awful compared to all the other boats, we need to get the sailmaker (Neil Tasker/Barracouta Sails) involved in the fine tuning of masts, booms and sails asap. Having said this, the masts flex nicely and seem to have very low drag when the tops are feathered. The pocket luff sails are quick to put on the masts, but fill with water in a capsize, making righting difficult. It is also impossible to reef neatly, not a problem for the racer, but the camper will need a track and slides.

How fast can we shunt? We have improved the windward shunting technique of traditional proas. They turn onto a reach, reverse the rudder and rig and sail off in the other direction, which is both slow and costs distance to windward. We now luff head to wind, then when the boat has almost stopped, haul on the new aft sail and rotate the rudders. The boat luffs quickly to hard on the wind on the other tack. The crew only have to move fore and aft on the trampoline, and the sheet loads are low. Not sure whether we can do this as fast as a cat can tack, but the difference is not huge. Gybe shunting is a different story. We are definitely slow, but have a bunch of ideas for improvements, most of which involve more vigorous crew movement. Upwind and down, shunting is totally safe and controlled, with no chance of getting into irons or capsizing. The





Sandwich maker goes sailing

YES, I did eventually get a short sail after various combinations of Rob, Mark, Bain and our friend Tim, took turns to zoom around the harbour on the Elementary. They were very appreciative of my sandwiches and I was taking photos so I felt content watching their obvious joy. The wait was worth every bit of buttered sliced bread.

Mark (captain and husband, in that order) and I on board, we quickly left the shore. Mark on the sheets near the leeward hull and me sitting at the 'rear end' (as in the end furthest from where we were headed) of the windward hull holding a tiller in each hand. Now you will appreciate that I am no sailor. Floating around the river on my self-made Bolger designed sailing dingy doesn't count for much although it has given me the beginnings of understanding about the wind - water - boat relationships required by a sailing person. Besides, I had full faith in Capt M.



steering also works very well, with huge amounts of control, particularly at low speeds.

The boat sails nose down when pressed, but this does not affect the handling. The bow shape rises through any waves with ease. Can't wait to try it downwind in big seas/breeze.

The fishnet trampoline is a pain to rig and keep tight. Lots of options to explore here, but all that happens is wet feet, so this is not urgent. The triangular beams are great, deflecting water downwards, although at speed it is still a wet ride.

Is it a Tornado beater? Not yet, but it certainly has the potential to be.

Is it fun? Absolutely, for far less cost and with far less stress on the sailors than Tornado racing. ❖

For further information or to arrange a test sail, please contact:

Harryproa
Website: www.harryproa.com/
Email: proa@iinet.net.au
Ph: 08 9284 3483 or 02 6655 2016

Two rudders make this boat very maneuverable, especially when you don't know what you're doing - okay when I didn't know what I was doing - so following clear instructions I held the fore rudder parallel to the hull and steered with the rear rudder. Easy. Whilst the beam obscured my view of the fore rudder somewhat it was possible to feel when the rudder was parallel and not fighting the water. Along we went.

Capt M on the sheets was controlling the speed we were going ... hm, straight towards the rock wall and a lot faster than my dear dinghy could ever dream of going. I'll admit that my faith in Capt was about to waver as the wall got a lot closer before he began to do something with the sheets (I'll get to understand that next time), and said "we're about to shunt, get ready to turn the rudders". I did so immediately, which was too soon - better to wait until the boat slows down, that way Capt doesn't get drenched and fall over on the tramp as the boat virtually stops dead and the rudders make a 'noise'.

Next time I was ready. Capt did his thing to the sheets. Boat slowed, I turned the rudders around from where I was sitting by pushing, then pulling with the tillers in a circular motion. Capt did something to sails and tightened sheets while I slid smoothly-ish along the windward hull to the new 'rear end' all the while grasping the tillers and staying on board. That was it - faster than it took you to read this paragraph - shunt complete and off we sped in the other direction. It really was that quick and easy.

Indeed, we sped across the harbour, faster and faster until up she went, flying a hull. This I was not ready for, and being instantly over excited by my new perspective I steered off the wind and down we came, as in, the boat ... then me, with a thud and I'm sure I heard a small chuckle from husband. Once I'd collected the tillers and myself, I paid more attention to what I was doing with the rudders. Making Capt promise not to sheet in harder I was able to manoeuvre the boat until the point of balance shifted and the hull lightened i.e. lifted, but not totally out of the water, not just yet. That excitement I will wait for until next time. And I think I have to do some sit-ups.

A few more shunts around the harbour and Capt and I headed happily to shore. It was someone else's turn to have some damn good fun.